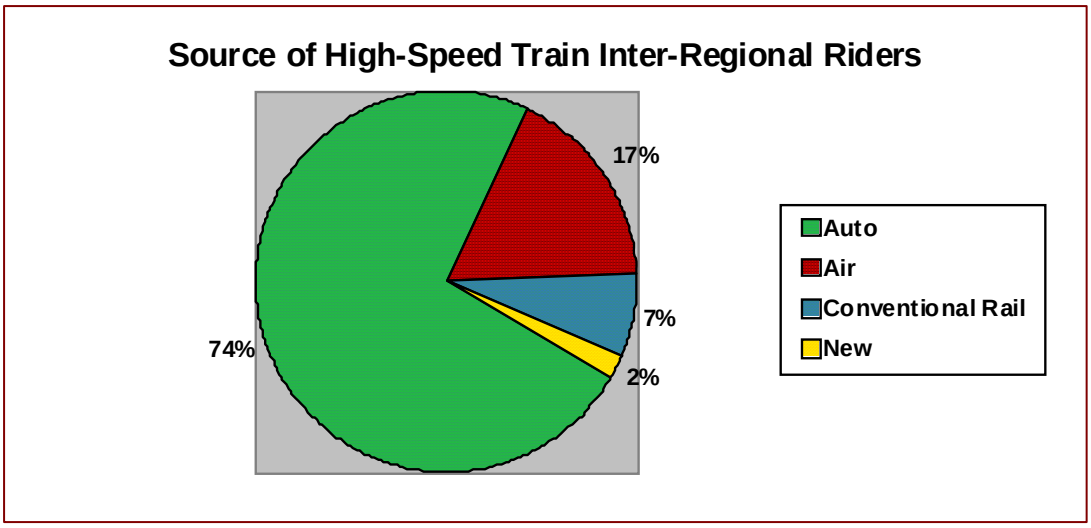
More Ridership Information

What percentage of the high-speed train riders is expected to be diverted from air transportation?

Because air traffic is a small proportion of the overall trips, diverted air passengers make up only 17% of the statewide inter-regional high-speed train passengers, auto 74%, and conventional rail 7% as shown in the figure at right. New induced and diverted trips represent 2% of inter-regional high-speed train trips.

Forty-five percent of the inter-regional high-speed train travel is for business and commuting purposes, and 55% for recreation and personal reasons. This is slightly more oriented to business and commuting than the overall 1/3-2/3 mix of inter-regional travel within the state.



Can high-speed trains compete with air transportation and the automobile in terms of travel times and fares?

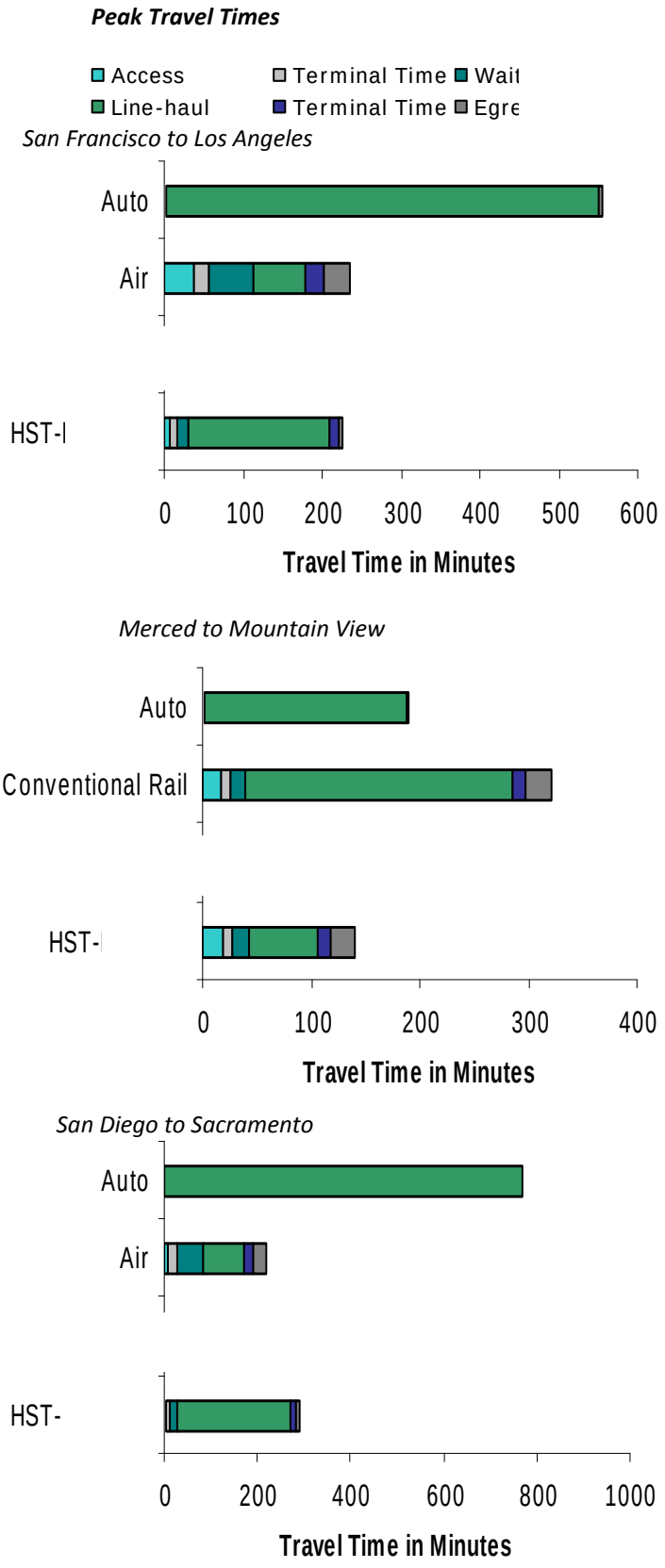
Yes, for trips between California's major metropolitan areas, high-speed trains would provide very competitive service as compared to other existing modes of transportation – including very competitive travel times and fares. Travel times, costs, frequency of service, and on-time arrivals are among the most important issues affecting a traveler's decision to travel by air, auto or rail.

Travel times and cost were developed for each available mode between each pair of 4,667 zones in the state. For the auto this was the driving time and cost, and parking cost for business areas. For air, rail, and HST trips, times and costs were calculated for the part of the trip on the plane or train, as well as for four other components:

- Access - getting to and from the station or airport
- Terminal Entry- parking, if driving, check-in, and passing through security
- Wait - waiting, boarding, and waiting for train or plane to leave the gate
- Terminal Exit - time to debark, get any luggage, reach a parked car, taxi, transit, or rental car
- Egress- getting to the final destination

Door-to-Door Time Examples

The relative competitiveness of the different modes can be seen in the figure below showing door-to-door times for three representative travel markets:



- San Francisco (Embarcadero Center) to Los Angeles (Civic Center) via air, auto or HST.
- Merced (UC Merced campus) to Mountain View via auto, conventional rail or HST.
- San Diego (Gas Lamp Quarter) to Sacramento (State Capitol) via air, auto or HST.

As can be seen HST is competitive with air on travel times for San Francisco to Los Angeles due to nearly identical door-to-door travel time, and being much faster than auto. This is a core market for which HST will compete well.

For Merced to Mountain View, a relatively short trip, automobile is the almost as fast as HST and has an advantage on availability, and compete well, depending on the relative costs.

For San Diego to Sacramento, air is 40 minutes faster than HST, and relative costs will play an important part in the travellers' decisions on whether to take HST or air.

Travel Costs in 2005$$

Total trip costs are primarily due to line-haul costs, but also include access and egress costs, including parking charges and tolls.

Future auto driving costs were based on gasoline costs of early 2006 of $2.93 per gallon, and other costs of operation and maintenance following the practice of the Bay Area Metropolitan Transportation Commission. These costs, along with average auto occupancy of 1.4 persons and miles per gallon of 21.9, were assumed to remain constant through 2030, resulting in a cost of $0.22 per auto traveller-mile.

Bridge tolls were assumed to remain at $4.00 for the seven Bay Area bridges that charge tolls, and free for the Coronado and Desmond bridges that used to charge tolls.

Auto trips ending in about 2/3 of the traffic zones in the Bay Area and Los Angeles region, ½ of the zones in San Diego, and ¼ of those elsewhere, generally in business clusters, will pay market based parking charges ranging from $5-35 per trip, depending on employment density in the zone.

Airport Pair	*Average One-Way Airfare (2005$$)*
SFO to LAX	*$139*
Oakland to Burbank	*$104*
SFO to Orange County	*$156*
Oakland to Ontario	*$95*
Sacramento to Bakersfield	*$132*
Sacramento to Burbank	*$98*
Fresno to LAX	*$175*
LAX to San Diego	*$166*
San Jose to Orange County	*$92*
San Jose to San Diego	*$97*
SFO to Bakersfield	*$137*
Fresno to San Diego	*$166*
Airport Abbreviations	
SFO = San Francisco International	
LAX = Los Angeles International	

Air fares were derived from the Federal Aviation Administration 10% ticket sample data of actual fares paid in 2005, averaged for all trip purposes. Selected air fares are shown in the adjacent table. Airport parking charges per trip were based on the daily cost of parking at airport-related facilities in 2005, ranging from $6 to $25.50.

Conventional rail fares were assumed to be equal to the per-ride cost of a current multi-ride ticket, except for the Amtrak San Joaquin and Pacific Surfliner Routes, for which full one-way ticket costs were assumed. Parking costs at stations will continue to be similar to those experienced today, in real terms.

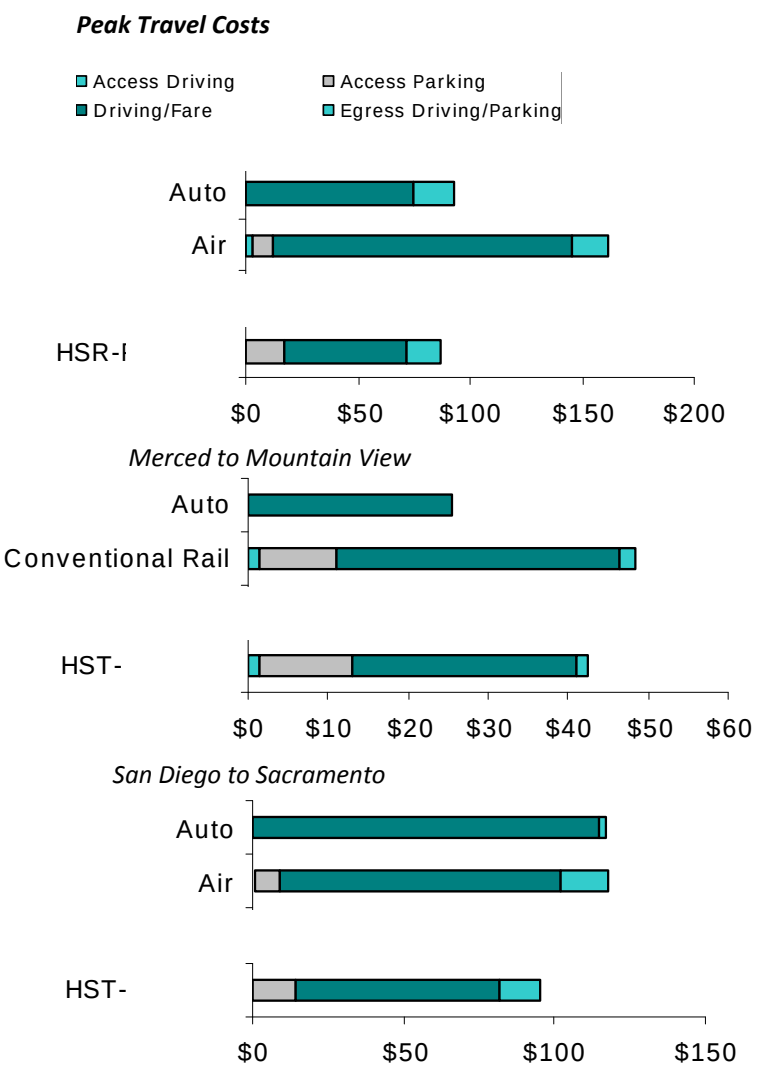
HST fares were set so that LA Union Station (LAUS) to San Francisco Transbay Terminal (SFTB) would cost about half of the average air fare from the SCAG airports to Bay Area airports, (resulting in a $55 fare for that trip).

Fares for other trips between regions were then calculated using a formula derived from this fare, with a fixed boarding charge of $15 plus a per-mile cost of $0.09. For trips within the SCAG, Bay Area, and San Diego regions a lower fare was assumed, with a $7 boarding fee plus $0.06 per mile. Selected station-to-station fares are shown in the table below. Parking costs for inter-regional travellers were set from $12 for the smaller, less urban stations to $18 for San Jose, Anaheim, Burbank, and LAUS, to $32 for SFTB. For intra-regional travel, parking was set at $3.

Station Pair	*One-Way HST Fare (2005$$)*
San Francisco to Gilroy	*$12*
Palmdale to Anaheim	*$23*
Temecula to San Diego	*$11*
San Francisco to Los Angeles Union Station	*$56*
San Jose to Sacramento	*$36*
Redwood City to Fresno	*$30*
Sacramento to Bakersfield	*$40*
Sacramento to Burbank	*$52*
Fresno to Los Angeles Union Station	*$38*
Bakersfield to Ontario	*$32*
Los Angeles Union Station to San Diego	$30

Door-to-Door Cost Examples

The relative competitiveness of the different modes can be seen in Figure __ showing door-to-door costs for three representative travel markets:



- San Francisco (Embarcadero Center) to Los Angeles (Civic Center) via air, auto or HST.
- Merced (UC Merced campus) to Mountain View via auto, conv. rail or HST.
- San Diego (Gas Lamp Quarter) to Sacramento (State Capitol) via air, auto or HST.

As can be seen HST is similar in cost to driving for San Francisco to Los Angeles, and both are substantially less expensive than air travel.

For Merced to Mountain View, a relatively short trip, automobile is clearly the most economical. Conventional rail is more expensive than HST since it is circuitous based on existing rail services and HST is a short direct trip.

For San Diego to Sacramento, air and auto cost about the same amount, and are both more expensive than HST.

Reliability of travel

The predictability and consistency of trip time plays a smaller part in travellers' choice of modes than cost or overall trip time, but is significant.

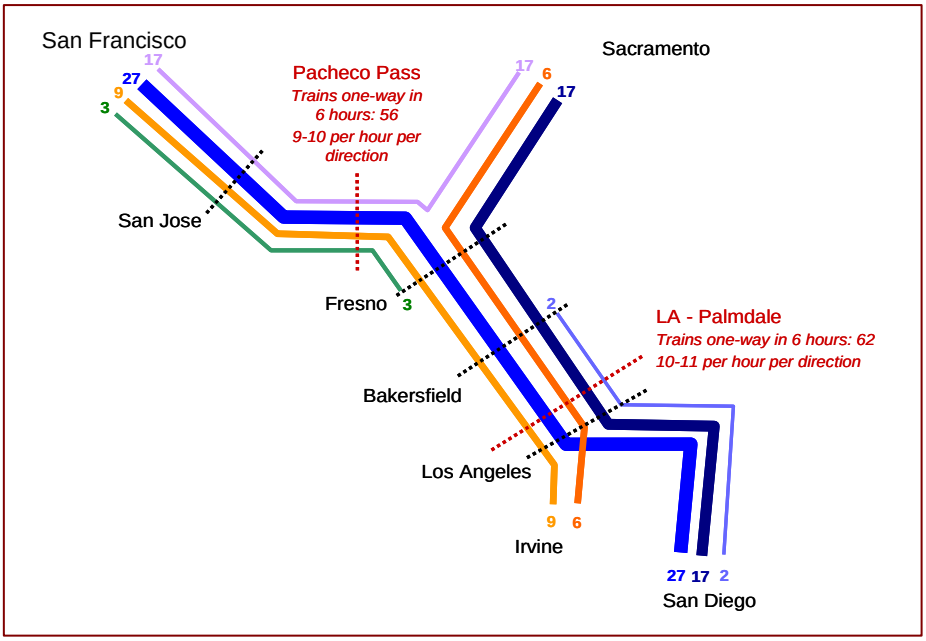
For auto trips it is defined as the probability that the trip will take no more than an hour longer than the driving time without congestion, and depends on the specifics of each trip as calculated by the model. The range can be illustrated by the example of driving from Los Angeles to San Francisco: a trip leaving during the peak morning rush hour and arriving in the afternoon has a 67% chance of arriving within an hour of the driving time without any congestion, and a trip off-peak has a 92% chance of arriving within that window.

For air and rail, on-time performance is expressed as a percent of trips that arrive within an hour of the scheduled time. Air on-time performance in 2030 was set at 94% based on FAA data for 2000 (91%) and 2005 (95%), and its forecast for 2025. Existing conventional rail services were assumed to maintain current performance with between 94% and 98% arrival within an hour for shorter services such as Metrolink and the Capitol Corridor, and 89% for the longer San Joaquin service. For high-speed rail, which operates in Asia and Europe with average delays of under a minute, on-time performance was set at 99%.

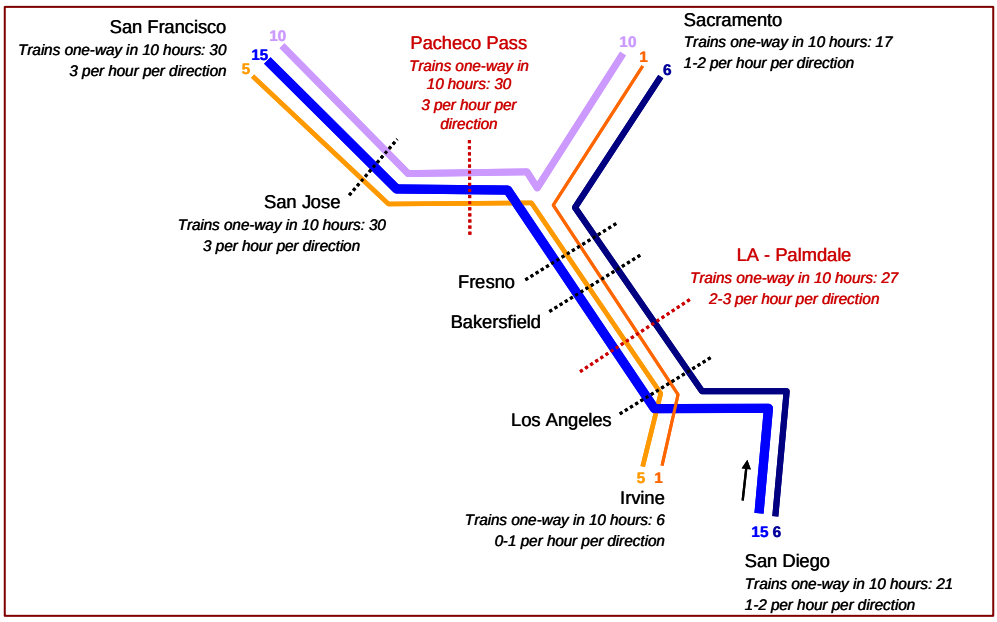
How many trains a day are expected to run each day, where would they stop, and how long would the trips take?

The HST operations for the base forecast include a total of 81 trains in each direction during the six hour a.m. and p.m. peak periods, or 13 trains per hour, as shown in the figure below. Up to 11 trains an hour per direction operate to/from San Francisco and Los Angeles, up to seven to/from Sacramento, up to eight to/from San Diego, and up to 3 per hour per direction to/from Irvine. During the remaining 10 hours of off-peak service, 37 trains per direction operate, making a total of 236 trains daily. (See off-peak figure next page.)

Trains in 6 Peak Hours, One-Way



Trains in 10 Off-Peak Hours, One-Way



In order to provide an effective combination of frequent service to all stations, and fast station to station service, trains operate with different stopping patterns grouped generally as follows:

- **Express,** representing 22% of trains;
- **Semi-express,** 16% of trains;
- **Regional-express**, 31% of trains;
- **Local,** 31% of trains.

High-speed train travel times were calculated using a standard train performance calculator, using existing in-service high-speed train characteristics such as horsepower, weight , braking rates, wind resistance, and the physical curves and grades of the alignment, with time added to allow for real world less-than optimal operation, and for stopping time in stations.

Each train type's time was based on non-stop run times between stations at which the specific high-speed train would stop. For example a non-stop Los Angeles to San Francisco high-speed train would take 2 hours and 38 minutes. With one stop, for example at San Jose, where trains are running relatively slowly, the trip would take 2 hours and 41 minutes, including time in the station to board and disembark. A stop at a station on the highest speed sections, such as Fresno, would add another 4 minutes for a two-stop trip of 2 hours. Express run times between stations are available for each potential station pair on the "Routes" section of this website.

What factors have changed since the 1999 ridership forecasts done by the Authority for California?

The current forecast for 2030 of 93 million trips (67 million inter-regional and 26 million within-region trips), made by Cambridge Systematics (CS), replaces the forecast for 2020 made by Charles River Associates (CRA) in 2000 for inter-regional trips (32 million), and the Authority's estimate of long-distance commuting (10 million).

The current CS forecast is a more complete picture of current and future total travel in California, it is made for a decade later (2030 vs. 2020), it includes more high-speed trains and stations than was planned in 2000, and it includes all trips, including commuting and other local travel.

At the same time, CS forecasts a lower diversion from all modes to high-speed trains than in the CRA work:

- 6% of inter-regional auto trips would shift to high-speed trains in the CS forecast, compared to 7% in the CRA forecast,
- 36% of in-state air trips would move to high-speed trains per CS, versus 56% per CRA, and
- 20% of inter-regional train trips would take high-speed trains per CS, down from 71% in the CRA forecast.

Paragraphs 1 & 2 below explain the reasons for the increased overall number of future trips in the state and the improvements in high-speed train service. Paragraph 3 describes the changes and forecast approaches for local trips within the LA Basin, Bay Area, and San Diego regions.

1) Total inter-regional trips increase from 264 million in 2020 (CRA) to 911 million in 2030 (CS)
    a. In the year 2030, there are expected to be 16% more people, jobs, and trips in California than in 2020. This creates 42 million more inter-regional trips a year.
    b. All trips statewide are included in the base, not just those between 11 metropolitan areas in the state. This adds 279 million trips a year from California north of Sacramento and San Francisco to central and southern California, trips from the Monterey Bay area and the Central Coast to the rest of the state, and to the foothills of the Sierras from elsewhere in the state, and vice versa. These trips generate 10% of high-speed rail riders, who drive or get a ride to a station such as Gilroy, Sacramento, or Merced to take the high-speed train elsewhere.
    c. The CS model was calibrated to match actual automobile flows on the state's highway system, resulting in a further increase of 326 million trips. CRA's explicit exclusion of long-distance inter-regional commuting from their work (such as from Sacramento to the Bay Area or Bakersfield to Palmdale), accounts for a large part of this difference.
2) High-speed train service is improved in the 2007 forecast
    a. The CS forecast includes service to Norwalk, Anaheim, and Irvine that was not in the CRA work. High-speed trains run to/from these stations through Los Angeles Union Station to the Central Valley and Bay Area, generating an added 4-5 million inter-regional high-speed train trips.
    b. More trains operate per day, 236 in the CS forecast, compared to 172 per day in the CRA 2000 forecast. Many of these are local and semi-express trains improving medium distance service. This was especially important in the markets of Bay Area – San Joaquin Valley, Los Angeles Basin – San Joaquin Valley, San Diego – Central Valley – Sacramento, and San Francisco – Sacramento, which generate 20 million high-speed train trips in 2030 in the CS forecast.

3) The CS forecast includes substantially more commuters and other local travel than the Authority estimated in 2000. In addition to the growth to 2030 and service improvements noted above, the CS forecast uses the regional travel models for the Southern California Association of Governments and the Bay Area Metropolitan Transportation Commission to forecast the within-region travel in these areas, a much more thorough approach than was used in 2000.

4) The primary source of increase in within-region travel is the Los Angeles Basin, with more local service than before, and the extension of service to Orange County, opening up significant markets within the extension and also from Orange County to north of Los Angeles. The 8.1 million LA Basin riders forecast for 2020 are now 20 million for 2030. The Bay Area forecast increased from 3.3 million to 4.5, and the San Diego region forecast from 0.2 to 0.4, based on ratios from the LA Basin forecasts.